

# Check list of fishes of Caprivi

by

B.C.W. van der Waal

Department of Zoology  
University of the North  
P/B X1106  
Sovenga 0727  
Republic of South Africa

and

P.H. Skelton\*

Albany Museum  
Grahamstown 6140  
Republic of South Africa

Received: 6 June 1983

Accepted: 13 June 1983

\* Present address:

J.L.B. Smith  
Institute of Ichthyology  
Grahamstown 6140  
Republic of South Africa

## ABSTRACT

Freshwater fish were collected from 39 collection sites in Caprivi, South West Africa/Namibia over a period of four years. Seventy-six species are recorded, four of which may be new to science. One species, *Mastacembelus vanderwaali*, was described in 1978. Distribution of fish species in Caprivi is also reported on. The Kwando River - Linyanti Swamp area contains two fish species not recorded from the Zambezi River or its flood-plain. The Zambezi contains at least 14 species that were not found in the Kwando River; ten of these species are strongly rheophilic, explaining their absence in the rapidless and rockless Kwando-Linyanti. Habitat preference is indicated on a simple scale for all the fish species. Many of the smaller fish species are adapted for specialised habitats e.g. fissures in rocks, sandy substrate and dense vegetation, but most fish seem to be adapted to swamp conditions. All the larger economically important fish species are widely distributed and occur commonly in a variety of habitats. Three small fish species seem to have a limited distribution, additional to narrow habitat requirements, rendering them sensitive to any habitat changes. Conservation measures are proposed for these fish species.

## CONTENTS

1 Introduction	303
2 Collecting sites and equipment	304
3 Hydrology	312
4 Results	313
4.1 Fish species collected	313
4.2 Distribution and habitat preferences	315
5 Discussion	315
6 Acknowledgements	319
7 References	320

## 1 INTRODUCTION

Caprivi is a finger-like extension to the north-eastern corner of South West Africa/Namibia and represents a territorial relict of the great aspirations of the German Empire to provide an east-west bridge between German East Africa (now Tanzania) and German West Africa. Caprivi was occupied for the first time in 1908 and named by Von Streitwolf in honour of the Chancellor, Count Von Caprivi. The strategic value of this relatively small area (11 655 km<sup>2</sup>) to Namibia lies in the rich supply of fresh water, of which there is a general shortage elsewhere in the territory.

Eastern Caprivi lies between 17° 30' and 18° 30'S and 23° 15' and 25° 15'E (Fig. 1) and has a general altitude of 930m aLL It is bordered in the north-east by the Zambezi River, which broadens into a flood-plain 20 km after becoming the Caprivi-Zambian border, and on the west and south by the Kwando River which after swinging eastwards, forms the Linyanti Swamp, Lake Liambezi and Chobe River, eventually draining into the Zambezi.

The upper Zambezi River is a typical "sand-bank" river (Jackson, 1961), mainly with a sandy bottom. Rocky substrates occur only at Katima Mulilo and at Impalila Island in Caprivi. At Katima Mulilo the Zambezi main stream crosses silicified riverine ferricretes to form rapids. The rocky outcrop at Impalila Island is a basalt dyke which forms the lip of the Eastern Flood-plain. The whole of Caprivi lies within the Kalahari Sand Basin and consequently soils are mainly sandy with clay soils occurring especially around Lake Liambezi and the Chobe River. The character of the Zambezi and the Kwando Rivers differs markedly in Caprivi. The Zambezi has a seasonally inundated flood-plain divided by many large permanent channels and low lying semi-permanent grass swamps. The meandering Kwando River is bordered by a vast, permanent *Phragmites mauritianus* and *Cyperus papyrus* swamp, filling all of its wide river valley with the exception of bays, backwaters, forest-covered islands and a strip of seasonally covered grassland. The Linyanti Swamp is similar to the Kwando but is generally more uniform.

# ERRATA:

Checklist of fishes of Caprivi by  
B.C.W. van der Waal and P.H. Skelton  
Madoqua Vol. 13 No. 4, pages 303-320.

1. Legend of Plate 5 should read:  
"Collecting site at Sangwali at high water in 1977. This used to be the road in 1973 - 1974 (site 25)."
2. Legend of Plate 5 should read:  
"Collecting site in Eastern Flood-plain on side of papyrus swamp (site 13)."
3. Legend of Plate 12 should read:  
"Netting a permanent lagoon of the Kwando, north of Kongola (site 34)."
4. Change of names in Tables 1, 2, 3, 4, and in text: ?*Clarias dumerilii* Steindachner, 1866 for *Clarias submarginatus* Peters, 1882.  
*Serranochromis (Sargochromis)* for *Haplochromis (Sargochromis)*; *Serranochromis (Serranochromis)* for *Serranochromis*.
5. Correction of spelling of names in Tables 1-4.  
*Oreochromis andersonii* for *O. andersoni*; *Pharyngochromis* for *Pharyngochochromis*

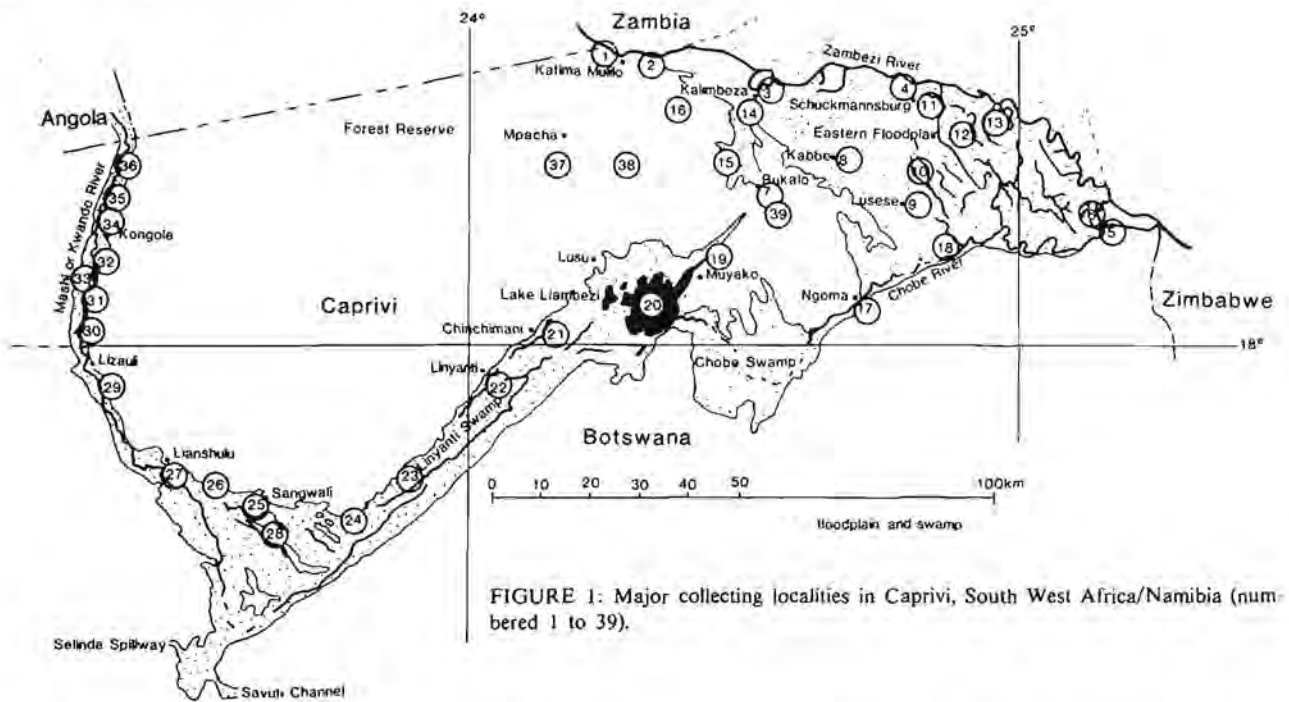


FIGURE 1: Major collecting localities in Caprivi, South West Africa/Namibia (numbered 1 to 39).

Lake Liambezi lies at the end of the Linyanti Swamp, has an open water surface of 10 000 ha and is bordered by a swamp of at least 20 000 ha. It is reported by Van der Waal (1980) that a fishery is established on the lake as well as on the Eastern Flood-plain. Seaman *et al.*, (1978) have described the limnology of Lake Liambezi.

#### Previous Fish Collections from Caprivi

Although several fish collections have been made from the upper Zambezi system and the Okavango Delta area (see e.g. Jubb & Gaigher, 1969), few reports of collections from the Caprivi area itself have been published. The Vernay-Lang Kalahari Expedition in 1930 made collections on the Chobe River at Kasane and Kabulubula (Fowler, 1935). Fish collections were taken by the Bernard Carp Expeditions in 1949 at Kabuta Kraal on the Chobe River and Nampini on the Zambezi River (Jubb, 1958). The second Bernard Carp Expedition to the area in 1952 made collections at Shangombo on the Kwando River to the north of the Caprivi area. These collections were reported on by Van den Berg (1956) and Jubb (1958). An expedition from the Queen Victoria Museum visited Caprivi in late November and December 1961 (Guy, 1962). Dr A. Maar accompanied this expedition and undertook further expeditions mainly to the Okavango Delta and Ngamiland during 1963 and 1964. During the 1961 expedition collections were made at Kazungulu, Katima Mulilo and Lake Liambezi and from the Chobe River on later expeditions.

## 2 COLLECTING SITES AND EQUIPMENT

The collections recorded here were made from October 1973 to January 1977 whilst one of us (B.C.W. v.d. W.) was employed by the Caprivi Government Service to in-

vestigate the fisheries of Lake Liambezi and their development.

Systematic collections and surveys of the fish life in the whole of Caprivi were made. As the area is relatively undeveloped and roads do not exist, sledge tracks were used with four-wheel drive vehicles to reach many of the collection sites. It was possible to reach certain localities, especially in the Linyanti Swamp and Eastern Flood-plain, only during certain seasons or even only once in the four years.

The following equipment was used to monitor fish populations and collect specimens in the different habitat types:

- 1 Seine-nets of 10,25 and 50 mm mesh and 10,40 and 50 m length respectively, used at a few prepared beaches on Lake Liambezi as well as in bays and pools where the current or submerged vegetation was not prohibitive.
- 2 A series of 10 gill-nets of 10-90 m length and 2,5 m depth with stretched mesh lengths of 25 to 190 mm. As the effectivity of a gill-net relies to a large extent on the relative flexibility of the material, the twine thickness was also gradually increased from 210/3 to 210/9. Gill-nets were extensively used in Lake Liambezi, deep and vegetated pools, bays and on the reed-fringed edges of rivers.
- 3 Hand scoop-net with a long handle and 2,5 mm mesh netting, used extensively on edges amongst vegetation and together with a shocker.
- 4 Electric shocker. A small 300W 250V AC portable generator was connected to a forked set of electrodes. The electrodes were spaced 20-40 cm apart depending on the conductivity of the water. This shocker was very effective in conjunction with a wide scoop-net for collecting smaller fishes in shallow rocky areas, shallow rapids and in dense vegetation.

- 5 Rotenone and explosives. Used occasionally to sample fish populations in vegetated pools and reed swamps.
- 6 Inspections of catches of local inhabitants. Many fish were recorded or collected from the catches from traditional traps, weirs and fish baskets.
- 7 Underwater observations. In situations like fast-flowing rapids, no effective collecting equipment was available and diving with a mask and snorkel was used to make observations. Fish were sometimes collected with a small hand-net under water.
- 8 Fishing lines. Some fish were collected or recorded by angling using artificial lures.

The following main collecting sites were visited periodically (Fig. 1). The number of collections made at each site is indicated. If gill-nets were used, at least one day was spent in the vicinity during which all possible methods were used to sample a wide variety of habitats.

#### A ZAMBEZI RIVER

- 1a Zambezi main stream, Katima Mulilo. Side of rapids over silcrete rock-bed with many cracks, fissures and loose rocks. Electric shocker and hand-nets. Collected 10 + times.
- 1b Zambezi, Katima Mulilo. Rain-water-fed stream and pool entering the Zambezi, bordered by *Echinochloa* sp. and *Phragmites australis*. Trap and hand-net. Collected 5 times, monitored daily over a period of one month.
- 2 Pool near Nangombe Channel, connected to Zambezi during high water. Deep pool with some marginal vegetation, *P. australis* and submerged grasses. Seine-nets and hand-net. Collected 3 times.
- 3 Kalimbeza Channel, Zambezi, strong flow, bordered by sand-banks, steep banks and *Echinochloa* sp. and *Salvinia molesta* mats in bays. Gill-nets, seines, hand-nets and angling. Collected 6 times.
- 4 Malila Channel, Zambezi, no flow, permanently connected to Zambezi, bordered by *P. mauritanus* and mats of *Echinochloa* sp.. Seine-nets, hand-net and gill-nets. Collected 3 times.
- 5 Impalila Island, Chobe River, strong-flowing rapids over basalt dyke. Electric shocker, hand-nets and inspection of fishermen's fish traps. Collected 2 times.
- 6 Kasaya Channel, Zambezi, strong flow, sandy bottom. Backwaters bordered by *Echinochloa* sp. and *Vossia* sp. mats, *Nymphaea caerulea* in backwater as well as some *Lagarosiphon major* and *Ceratophyllum demersum*. Gill-nets and hand-net. Collected 2 times.

#### B EASTERN FLOOD-PLAIN AND CHOBE RIVER

- 7 Bukalo Mulapo. Border of flood-plain, shallow, water running temporarily through grass. Hand-net, seine-net and gill-nets. Collected 4 times.

- 8 Limbeza, Kabbe. Semi-permanent pool, partly covered by *Echinochloa* sp. and other water grasses. Seine-net and electric shocker. Collected 2 times.
- 9 Lusese. Permanent pool with abundant floating organic material and *Echinochloa* sp. mats. Gill-nets and hand-net. Collected once.
- 10 Mutualwize, Lusese. Very large permanent drainage channel, deep water with beds of *Nymphaea caerulea*, *Echinochloa* sp., *C. demersum*, *L. major* and *Najas pectinata*. Gill-nets, seine-nets and hand-nets. Collected 5 times.
- 11 Schuckmannsburg. Permanent water-holes in flood-plain, grass on channel banks. Seine-net and hand-net. Collected 3 times.
- 12 Nsundwa. Pools near large lake, partly covered by water grasses and *Salvinia* mat. Seine-net and hand-net. Collected 2 times.
- 13 Bukuzu, near Nsundwa. Papyrus swamp. Hand-net. Collected 2 times.
- 14 Lake Lisikili. Large open lake bordered by *S. molesta* and Cyperaceae floating mat. Seine-net, hand-net and electric shocker under mats. Collected 3 times.
- 15 10 km north of Bukalo. Edge of flood-plain. Water running through grass at culvert. Hand-net. Collected 3 times.
- 16 Namalubi. Edge of flood-plain, water running through grass. Hand-net. Collected 2 times.
- 17 Chobe River, Ngoma. River running slowly. Dense mats of water grass and *S. molesta*. Inspection of traps and hand-net. Collected 2 times.
- 18 Chobe River, Ihaha. Oxbow of Chobe, muddy bottom and many water plants: *Nymphaea caerulea*, *N. lotus*, *Ceratophyllum demersum* and *Lagarosiphon major*. Gill-nets and hand-net. Collected once.

#### C LAKE LIAMBEZI

- 19 Small stream entering lake near Chaka, rain-fed. Hand-net. Collected 6 times.
- 20 Lake Liambezi. Muddy organic bottom, average depth of water 2,5m. Large *P. mauritanus* and *Typha capensis* beds, also beds of submerged water plants: mainly *L. major*, *N. pectinata*, *C. demersum*, *Potamogeton* spp. and *Utricularia* spp. Large areas covered by *S. molesta*. Gill-nets, seines and hand-nets. Collected 80 times at 7 localities.

#### D LINYANTI SWAMP

- 21 Chinchimane Channel. Flowing water over sandy bottom with water plants: *Ottellia* spp., *Najas pectinata*, *C. demersum*, *L. major*, bordered by vast *P. mauritanus*, and *Cyperus papyrus* beds. Gill-nets and hand-net. Collected 2 times.



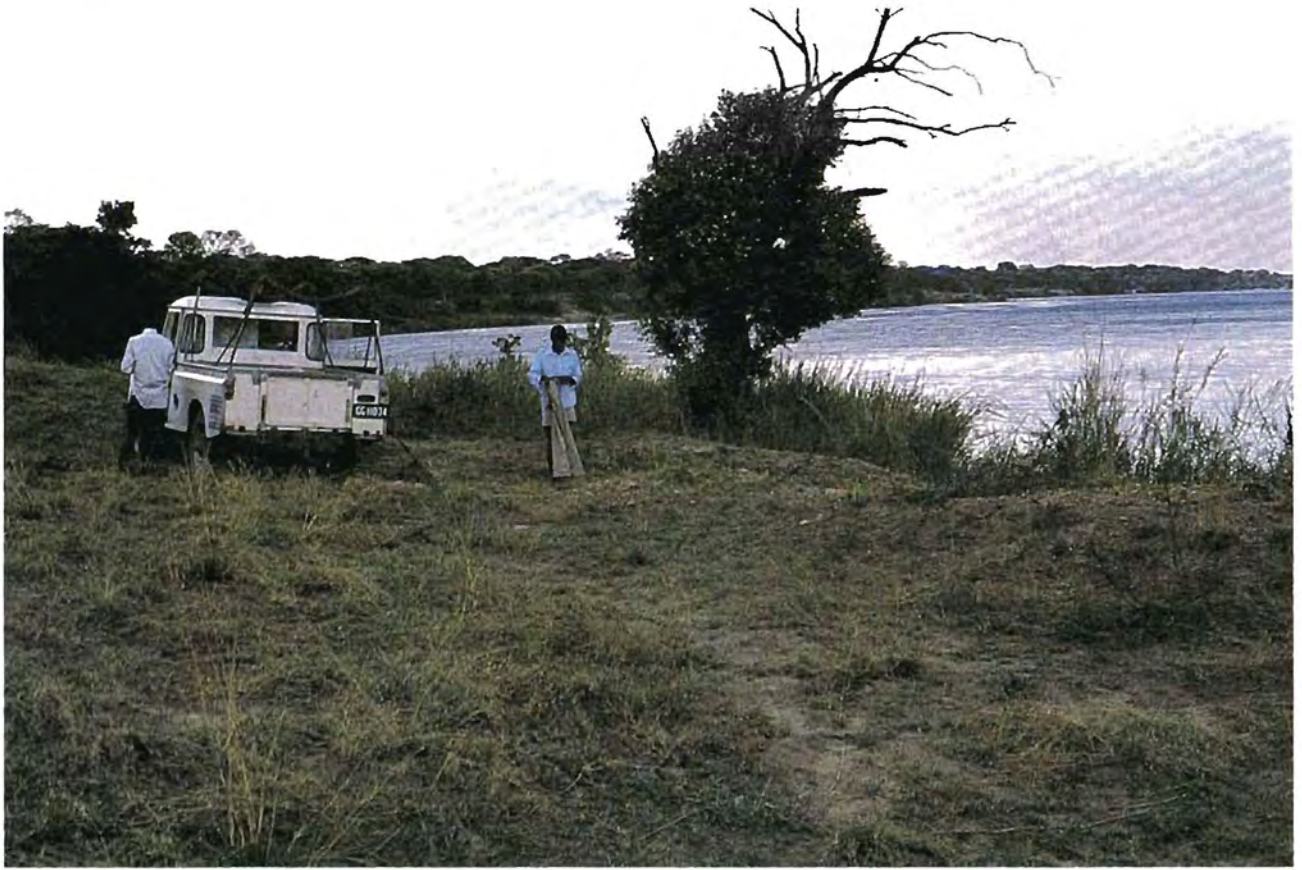


PLATE 1: Zambezi River at low level at Katima Mulilo – shallow rapids at collecting site 1.



PLATE 2: Zambezi River near Kalimbeza (site 3). Note sand-banks.



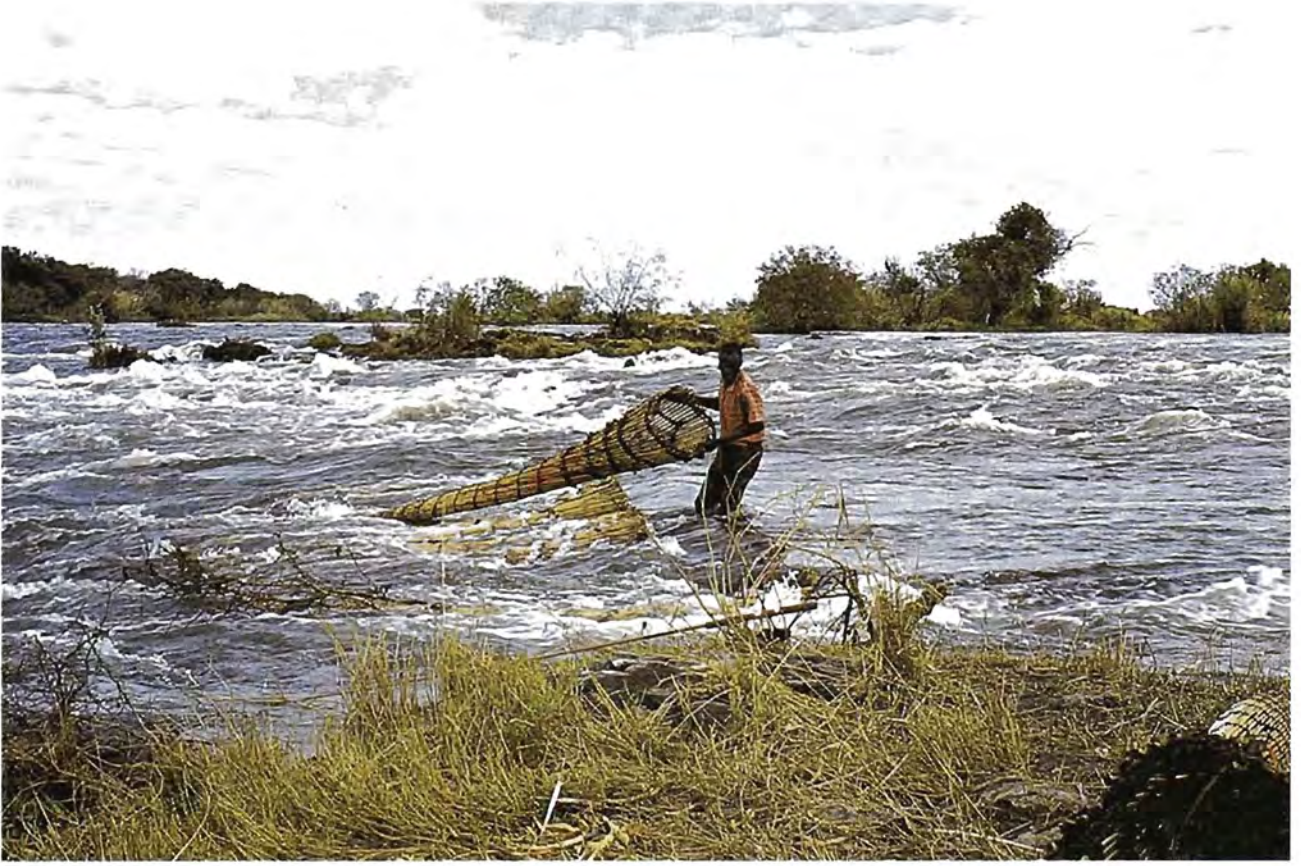


PLATE 3: Rapid in Chobe River, near confluence with Zambezi River (site 5). Fisherman is removing fish trap.



PLATE 4: Eastern Flood-plain in flood. Mutualwize Channel with inundated forest of *Zizygium guineense* in centre of picture (site 10).





PLATE 5: Collecting site in Eastern Flood plain on side of papyrus swamp (site 13).



PLATE 6: Lake Liambezi from the north. Dark brown patches are beds of *Salvinia molesta*.





PLATE 7: Netting channel on Lupala Island, south of Sangwali (site 28), water level very low in 1973.



PLATE 8: Collecting site at Sangwali at high water in 1977. This used to be the road in 1973 - 1974 (site 25).





PLATE 9: Backwater of Kwando River near Lizauli (site 31).



PLATE 10: Sakamanduna Pan. collecting site of *Nothobranchius* sp. (site 38).





PLATE 11: Kwando River near Choyi, note dark brown water, swamp and forest clad island (site 33).



PLATE 12: A net in the Kwando River.



- 22 Linyanti Channel. Flowing water, same conditions as Chinchimane. Gill-nets and hand-net. Collected 2 times.
- 23 Batobaja. Flood-plain, extensive water grasses (Cyperaceae), water plants and reeds. Seine-net, hand-nets, electric shocker and rod and line. Collected once.
- 24 Lionga, Malengalenga. Grassy flood-plain. Inspection of traps and hand-net. Collected once.
- 25 Sangwali. Stream running through reed swamps. Well-vegetated along margins: *Nymphaea caerulea*, *Echinochloa* sp., *C. demersum*, *Najas pectinata* and *Utricularia* spp.. Gill-nets, seine, hand-net, electric shocker and angling. Collected 5 times.
- 26 Mangana. Permanent water-hole on edge of flood-plain. Little vegetation. Seine and hand-net. Collected 2 times.
- 27 Lianshulu. Oxbow of Kwando River. Deep water (4m) with *Nymphoides indica*, *Nymphaea caerulea*, *N. lotus*, *C. demersum* and *Najas pectinata*. Gill-nets, seine and hand-net. Collected 3 times.
- 28 Lupala Island. Isolated pool, no water plants. Seine-net. Collected 2 times.

#### E KWANDO RIVER

- 29 Kasiba, Lizauli. Branch of Kwando River, isolated. Deep holes, muddy, no vegetation. Seine-net. Collected 2 times.
- 30 10 km north of Lizauli. Water-hole in *P. mauritanus* and *Typha capensis* bed, full of *N. pectinata*, *L. major* and *C. demersum*. Gill-nets. Collected once.
- 31 Sijwa. Branch of Kwando River. Dense beds of *Myriophyllum spicatum*, *Potamogeton* spp., *L. major*, *N. pectinata* and *C. demersum*. Stream bordered by *P. mauritanus*, *C. papyrus* and *Echinochloa* sp.. Gill-nets and hand-net. Collected 3 times.
- 32 Choyi. Edge of grassy flood-plain. Shallow water. Hand-net. Collected once.
- 33 Choyi. Sand-bank in Kwando River, strong current. Hand-net. Collected 3 times.
- 34 Kongola. Isolated water-hole in flood-plain with *N. pectinata* and *L. major* beds. Seine and hand-net. Collected 2 times.
- 35 Sesheke. Isolated pools in flood-plain. Muddy. Seine-net. Collected 3 times.
- 36 Singalamwe. Deep isolated pool in flood-plain, *L. major* beds, seine-net. Collected once.

#### F FOREST PANS

- 37 Katete pans. Large rain-fed pans with water grasses, *Lagarosiphon ilicifolius*, *Utricularia* spp. and *Ottellia* sp. Seine-nets and hand-nets. Collected 4 times.

- 38 Small pan near Gunkwe. Rain-fed pan full of *Cyperus* sp. and *Ottellia* sp.. Hand-net. Collected 2 times.
- 39 7 km south of Bukalo. Rain-fed pan with *Cyperus* sp. and grasses, also *Ottellia* sp.. Collected 2 times.

#### 3 HYDROLOGY

The terrain in Caprivi is remarkably level so that hydrological factors have a large influence on the area available to fish as well as on terrestrial life and govern the lives of the Eastern Flood-plain-living Basubia people. The 284 000 km<sup>2</sup> catchment of the Zambezi River above Katima Mulilo covers most of western Zambia and parts of eastern Angola (Du Toit, 1936). Differences of up to 8.2 m have been recorded between low water and flood in the river above the flood-plain, but the average rise over a period of 23 years is 5.2 m at Katima Mulilo (data from the Department of Water Affairs, Windhoek). The flood inundates most of the Eastern Flood-plain, leaving only the higher sandy ridges as islands. Low water level occurs in October, with a sharp rise in January reaching one or more peaks in February to April before a decline in May – June. The flood-plain is thus annually inundated from February to June. During low water from September to December most of the area is totally dry and is covered by terrestrial grasses.

The Kwando (or Mashi) River originates further west in Angola and has a catchment area of 57 000 km<sup>2</sup> (Colquhoun, 1986). The seasonal difference in water level is only 1 m on average in the 2–10 km broad river valley. Water level differences are even less in the 10–30 km wide Linyanti Swamp at the southern end of the Kwando River. The floods in this system are retarded as a result of the meandering course of the main river and the cushioning effect of the vast *Phragmites* – *Typha* – *Cyperus* swamps that largely fill the river valley. The flood peak therefore only reaches Kongola near the northern border of Caprivi during May – June and Lake Liambezi at the end of the Linyanti Swamp by August. This flood is only able to stabilise the receding water level of Lake Liambezi, the rest being lost to evaporation. The lake connects with the Zambezi via the Chobe River, which presently is completely blocked by vegetation, including *S. molesta*. Most of the water of the Chobe River originates in the Zambezi floods enabling the Chobe to push back as far as and beyond Ngoma (Fig. 1). When the floods recede, the flow changes direction and drains the southern part of the Eastern Flood-plain. During low water the Chobe does however drain part of the water of Lake Liambezi if the lake is full enough. Under such circumstances, flow in the Chobe changes direction three times a year: August – January eastwards towards the Zambezi (Kwando flood and rain-water drainage), February – March westwards towards Lake Liambezi (without reaching it!) and April – June eastwards – drainage of flood-plain. In high flood years, when the gauge at Katima Mulilo registers 7.0 m or more for a period of more than two

weeks, there is a direct shallow link between the Zambesi flood-plain and Lake Liambezi at Bukalo (Fig. 1). Available water level data from 1952 to 1975 show that a possible temporary link may have been established during ten high flood years.

There is a similar shallow temporary connection between the Okavango River and the Kwando via the Magwegana or Selinda Spillway. This always brings water from the Okavango towards the Kwando/Linvanti, as was observed during 1975, an exceptionally high flood year. During average or below average years the Selinda may be totally dry.

## 4 RESULTS

### 4.1 Fish species collected

Table 1 gives a summary of fish species collected during the period. Fish were identified in the field by one of us (B.C.W. v.d. W.) and preserved material was initially

sent to the Queen Victoria Museum, Harare (formerly Salisbury), and later to the Albany Museum, Grahams-town, where provisional identifications were confirmed by G. Bell-Cross and by P.H.S..

The collections include a few undescribed species or species of uncertain identification. Of the new species, *Mastacembelus vanderwaali* Skelton (1976) has been described. The status of the *Nothobranchius* species is being investigated (Jubb, pers. comm.) and is likely to be undescribed. The small catfishes previously referred to as *Leptoglanis* species have been shown by Eccles (in prep.) to belong to the Zairean genus *Zaireichthys*. Two new *Zaireichthys* species are included in these collections.

Skelton (in press) has shown that the *Amphilius* species usually referred to as *A. platyichir* in southern and east Africa is not that species and refers it to *Amphilius uranoscopus* (Pfeffer).

TABLE 1: Check list of fish species collected in Caprivi.

Fish species		Standard English name	Afrikaans name
<b>Mormyridae</b>			
<i>Petrocephalus catostoma</i>	(Günther, 1866)	churchill	churchill
<i>Pollimyrus castelnaui</i>	(Boulenger, 1911)	dwarf stonebasher	dwerg-klipstamper
<i>Hippopotamyrus ansorgii</i>	(Boulenger, 1905)	slender stonebasher	slank klipstamper
<i>Hippopotamyrus discorhynchus</i>	(Peters, 1852)	Zambezi parrotfish	Zambezi-papegaavis
<i>Marcusenius macrolepidotus</i>	(Peters, 1852)	bulldog	boelhond
<i>Mormyrus lacerda</i>	Castelnaui, 1861	western bottlenose	westelike bottleneus
<b>Characidae</b>			
<i>Hydrocynus vittatus</i>	Castelnaui, 1861	tigerfish	tiervis
<i>Alestes lateralis</i>	Boulenger, 1900	striped robber	streep-rower
<i>Micralestes acutidens</i>	(Peters, 1852)	silver robber	silwer rower
<i>Rhabdalestes maunensis</i>	(Fowler, 1935)	Okavango robber	Okavango rower
<b>Hepsetidae</b>			
<i>Hepsetus odoë</i>	(Bloch, 1794)	African pike	Afrikaanse greepvis
<b>Citharinidae</b>			
<i>Hemigrammocharax multifasciatus</i>	(Boulenger, 1923)	multibar citharine	veelbalk-sitarien
<i>Hemigrammocharax machadoi</i>	Poll, 1967	dwarf citharine	dwerg-sitarien
<i>Nannocharax macropterus</i>	Pellegrin, 1925	broad-barred citharine	breëbalk-sitarien
<b>Cyprinidae</b>			
<i>Barbus codringtonii</i>	Boulenger, 1908	Upper Zambezi yellowfish	Bo-Zambezi-geelvis
<i>Barbus poechii</i>	Steindachner, 1911	dashtail barb	streepstert-ghieliemientjie
<i>Barbus paludinosus</i>	Peters, 1852	straightfin barb	lynvin-ghieliemientjie
<i>Barbus eutaenia</i>	Boulenger, 1904	orange-fin barb	oranjevlerk-ghieliemientjie
<i>Barbus tangandensis</i>	Jubb, 1954	redspot barb	rooikol-ghieliemientjie
<i>Barbus multilineatus</i>	Worthington, 1933	copperstripe barb	koperstreep-ghieliemientjie
<i>Barbus afrovernayi</i>	Nichols & Boulton, 1927	spottail barb	kolstert-ghieliemientjie
<i>Barbus unitaeniatus</i>	Günther, 1866	longbeard barb	langbaard-ghieliemientjie
<i>Barbus lineomaculatus</i>	Boulenger, 1903	line-spotted barb	lynspikkel-ghieliemientjie
<i>Barbus bifrenatus</i>	Fowler, 1935	hyphen barb	skakel-ghieliemientjie
<i>Barbus thamalakanensis</i>	Fowler, 1935	Thamalakane barb	Thamalakane-ghieliemientjie
<i>Barbus fasciolatus</i>	Günther, 1868	red barb	rooi-ghieliemientjie
<i>Barbus barotseensis</i>	Pellegrin, 1920	Barotse barb	Barotse-ghieliemientjie
<i>Barbus barnardi</i>	Jubb, 1965	blackback barb	swartrug-ghieliemientjie
<i>Barbus haasianus</i>	David, 1936	sicklefin barb	sekelvin-ghieliemientjie
<i>Barbus puellus</i>	Nichols & Boulton, 1927	dwarf barb	dwerg-ghieliemientjie
<i>Barbus radiatus</i>	Peters, 1853	Beira barb	Beira-ghieliemientjie
<i>Coptostomabarbus wittei</i>	David & Poll, 1937	upjaw barb	hoel-ghieliemientjie
<i>Labeo cylindricus</i>	Peters, 1852	redeye labeo	rooi oog-labeo
<i>Labeo lunatus</i>	Jubb, 1963	Upper Zambezi labeo	Bo-Zambezi-labeo
<i>Opsaridium zambezensis</i>	(Peters, 1852)	barred minnow	balk-ghieliemientjie



Table continued from previous page.

Fish species		Standard English name	Afrikaans name
<b>Bagridae</b>			
<i>Auchenoglanis ngamensis</i>	Boulenger, 1911	Zambezi grunter	Zambezi-knorbaber
<i>Zaireichthys</i> sp. ( <i>Leptoglanis rotundiceps</i> )		spotted catlet	gevlekte babertjie
<i>Zaireichthys</i> sp. (cf. <i>Leptoglanis dorae</i> )			
<i>Zaireichthys</i> sp.			
<b>Clariidae</b>			
<i>Clarias gariepinus</i>	(Burchell, 1822)	sharptooth catfish	skerptand-baber
<i>Clarias ngamensis</i>	Castelnau, 1861	blunttooth catfish	stomptand-baber
<i>Clarias theodorae</i>	Weber, 1897	snake catfish	slangbaber
<i>Clarias submarginatus</i>	Peters, 1882	blotched catfish	gevlekte baber
<i>Clariallabes platyprosopos</i>	Jubb, 1964	broadhead catfish	breëkop-baber
<b>Schilbeidae</b>			
<i>Schilbe mystus</i>	(Linnaeus, 1762)	silver catfish	silwer baber
<b>Mochokidae</b>			
<i>Synodontis nigromaculatus</i>	Boulenger, 1905	spotted squeaker	spikkel-skreeubaber
<i>Synodontis woosnami</i>	Boulenger, 1911	Upper Zambezi squeaker	Bo-Zambezi skreeubaber
<i>Synodontis macrostigma</i>	Boulenger, 1911	largespot squeaker	grootvlek-skreeubaber
<i>Synodontis leopardinus</i>	Pellegrin, 1914	leopard squeaker	luiperdkol-skreeubaber
<i>Chiloglanis neumanni</i>	Boulenger, 1911	Neumann's rock catlet	Neumann se suierbekkie
<b>Amphiliidae</b>			
<i>Amphilius uranoscopus</i>	(Pfeffer, 1889)	Stargazer mountain catfish	opkyk-bergbaber
<b>Cyprinodontidae</b>			
<i>Nothobranchius</i> sp.			
<i>Aplocheilichthys johnstonii</i>	(Günther, 1893)	Johnston's topminnow	Johnston se lampogie
<i>Aplocheilichthys katangae</i>	(Boulenger, 1912)	striped topminnow	streep-lampogie
<i>Aplocheilichthys hutereaui</i>	(Boulenger, 1913)	trellised topminnow	tralie-lampogie
<b>Cichlidae</b>			
<i>Oreochromis macrochir</i>	(Boulenger, 1912)	green-headed tilapia	groenkop-tilapia
<i>Oreochromis andersoni</i>	(Castelnau, 1861)	threespot tilapia	driekol-tilapia
<i>Tilapia sparrmanii</i>	Smith, 1840	banded tilapia	vlei-tilapia
<i>Tilapia rendalli rendalli</i>	(Boulenger, 1896)	northern redbreast bream	noordelike rooibors-tilapia
<i>Tilapia ruweti</i>	(Poll & v.d. Audenarde, 1965)	Okavango tilapia	Okavango-tilapia
<i>Hemichromis fasciatus</i>	Peters, 1857	banded jewelfish	balk-juweelvis
<i>Haplochromis (Sargochromis) giardi</i>	(Pellegrin, 1904)	pink happy	ligroos happie
<i>Haplochromis (Sargochromis) codringtoni</i>	(Boulenger, 1908)	green happy	groen happie
<i>Haplochromis (Sargochromis) carlottae</i>	(Boulenger, 1905)	rainbow happy	reënboog-happie
<i>Pharynochromis darlingi</i>	(Boulenger, 1911)	Zambezi happy	Zambezi-happie
<i>Haplochromis (Sargochromis) greenwoodi</i>	(Bell-Cross, 1975)		
<i>Serranochromis robustus jallae</i>	(Boulenger, 1896)	nembwe	nembwe
<i>Serranochromis macrocephalus</i>	(Boulenger, 1899)	purpleface largemouth	persgesig-grootbek
<i>Serranochromis longimanus</i>	(Boulenger, 1911)	longfin largemouth	langvin-grootbek
<i>Serranochromis angusticeps</i>	(Boulenger, 1907)	thinface largemouth	smalkop-grootbek
<i>Serranochromis thumbergi</i>	(Castelnau, 1861)	brownspot largemouth	bruinkol-grootbek
<i>Pseudocrenilabrus philander</i>	(Weber, 1897)	southern mouthbrooder	suidelike mondbroeier
<b>Anabantidae</b>			
<i>Ctenopoma multispinis</i>	Peters, 1844	many-spined climbing perch	stekelrige kurper
<i>Ctenopoma cienotis</i>	(Boulenger, 1919)	blackspot climbing perch	swarkol kurper
<b>Mastacembelidae</b>			
<i>Mastacembelus frenatus</i>	Boulenger, 1914	longtail spiny-eel	langstertstekelpaling
<i>Mastacembelus vanderwaali</i>	Skelton, 1978	marbled spiny-eel	bont stekelpaling

## 4.2 Distribution and habitat preferences

Information on these two aspects is summarised in Tables 2 and 3. Caprivi was divided into five areas on the basis of the water body types found there: i) Zambezi River; ii) Eastern Flood-plain and Chobe; iii) Lake Liambezi; iv) Linyanti Swamp and v) Kwando River. Zambezi River includes all directly connected backwaters. There is no clearly defined border between the Kwando River and Linyanti Swamp but there is a gradual change in habitat type and the sharp bend in the river (where the Selinda enters the system) was taken to terminate the Kwando. No collections could however be conducted near this border.

The results indicate the relative abundance and frequency occurrence over the number of collecting sites of one of the areas or habitat types. The five values of abundant to rare give an indication of relative abundance as well as frequency occurrence at all stations of a region or habitat together. Equipment selectivity was taken into account as far as possible. As can be deduced from the descriptions of collecting sites, habitats could be broadly divided into five types:

## A Running water

A.1 Rocky bottom. Turbulent fast-flowing water, shallow at low river level (2–100 cm). Bed-rock with fissures, crevices or boulders.

A.2 Sandy bottom. Water current speed lower than in A.1, bottom sandy, water depth 5–200 cm.

## B Standing water

B.1 Deep water. Water 2–6 m deep, with muddy or occasionally sandy bottom and submerged hydrophytes sometimes present.

B.2 Shallow water. Water 2–100 cm deep with sandy or muddy bottom.

B.2.1 Swamp. Permanently covered with water. True submerged and emergent aquatic plants present.

B.2.2 Flood-plain. Temporarily covered by flood- or rain-water. Vegetation emergent, often adapted terrestrial plants with true aquatic hydrophytes sometimes present.

There is a distinct difference between the last two habitat types in that the shallow standing water with aquatic vegetation (swamp) is a permanent water whereas the shallow standing water with emergent vegetation (flood-plain) is temporary and more thickly covered by vegetation, mainly grasses. The values given for the various fish species again express the frequency of occurrence as well as relative abundance in each collecting site for all the collection sites of one habitat type. It must be remembered that often two or more habitat types were present and sampled separately by different fishing equipment at one locality.

## 5 DISCUSSION

Seventy-six species have been collected in the Caprivi. Most habitats were collected intensively but it is possible

TABLE 2: Distribution of fish species in Caprivi, expressed as relative frequency of occurrence.

Fish species	Zambezi River	Eastern Flood-plain and Chobe	Lake Liambezi	Linyanti Swamp	Kwando River
<i>P. catostoma</i>	xxxx	xxx	xxxx	-	x
<i>P. castelnaui</i>	x	xxxx		x	-
<i>H. ansorgii</i>	x	-		-	-
<i>H. discorhynchus</i>	x	-		-	-
<i>H. macrolepidotus</i>	xxx	xxxx	xxxx	xxx	xxx
<i>M. lacerda</i>	xxx	xx	xx	xx	x
<i>H. vittatus</i>	xxxx	xx	x	-	xx
<i>H. odoë</i>	xx	xxxx	xxxx	xxxx	xxx
<i>A. lateralis</i>	xxxx	xx	xxxx	xxxx	xxx
<i>M. acutidens</i>	xxxx	x	-	-	x
<i>R. maunensis</i>	x	xx	x	xx	x
<i>H. multifasciatus</i>	xx	x	-	x	x
<i>H. machadoi</i>	x	xx		x	x
<i>N. macropterus</i>	x	-	-	-	-
<i>B. codringtonii</i>	x		-	-	
<i>B. poechii</i>	xxxx	xxxx	xx	xx	x
<i>B. paludinosus</i>	xxx	xxxx	xx	xx	x
<i>B. eutaenia</i>	xx	-	-	-	-
<i>B. tangandensis</i>	x	x	-	-	-
<i>B. multilineatus</i>	x	xx	x	x	x
<i>B. afrovernayi</i>	x	x	-	-	x
<i>B. unitaeniatus</i>	x	xx	x	x	x
<i>B. lineomaculatus</i>	x	x	-	x	-

xxxx abundant    xxx common    xx regular    x rare    - not collected



Table continued from previous page.

Fish species	Zambezi River	Eastern Flood- plain and Chobe	Lake Liambezi	Linyanti Swamp	Kwando River
<i>B. bifrenatus</i>	xx	xxx	xxx	xx	x
<i>B. thamalakanensis</i>	xx	xx	-	xx	xx
<i>B. fasciolatus</i>	xx	xx	-	x	x
<i>B. barotseensis</i>	xx	xx	x	x	-
<i>B. barnardi</i>	xx	x	x	x	x
<i>B. haasianus</i>	x	xxx	-	x	-
<i>B. radiatus</i>	xx	xx	xxx	-	x
<i>B. puellus</i>	x	-	-	-	-
<i>C. wittei</i>	xx	xxx	x	xx	x
<i>L. cylindricus</i>	xxx	-	-	-	-
<i>L. lunatus</i>	xx	x	x	-	x
<i>O. zambezensis</i>	x	-	-	-	x
<i>A. ngamensis</i>	xx	x	-	-	xx
<i>Z. sp. (L. rotundiceps)</i>	x	-	-	-	-
<i>Z. sp. (cf. L. dorae)</i>	-	-	-	-	x
<i>Zaireichthys sp.</i>	x	-	-	-	-
<i>C. gariepinus</i>	xxx	xxxx	xxxx	xxxx	xxx
<i>C. ngamensis</i>	xx	xxx	xxx	xxx	x
<i>C. theodora</i>	x	xxxx	x	x	xx
<i>C. submarginatus</i>	x	xx	-	-	x
<i>C. platyprosopus</i>	x	-	-	-	-
<i>S. mystus</i>	xxx	xxxx	xxxx	xxxx	xxx
<i>S. nigromaculatus</i>	xxx	xx	xxx	xx	xx
<i>S. woosnami</i>	xxxx	xxxx	xxx	xxx	xxx
<i>S. macrostigma</i>	xx	xx	xxx	x	x
<i>S. leopardinus</i>	xx	xx	xx	xx	x
<i>C. neumanni</i>	x	-	-	-	-
<i>A. uranoscopus</i>	x	-	-	-	-
<i>Nothobranchius sp.</i>	-	x	-	-	-
<i>A. johnstonii</i>	xxx	xxxx	xxx	xxx	xxx
<i>A. katangae</i>	x	-	-	x	x
<i>A. hutereaui</i>	x	xxx	x	x	x
<i>O. macrochir</i>	xxxx	xxxx	xxx	xxx	xxx
<i>O. andersonii</i>	xxxx	xxxx	xxx	xxx	xxx
<i>T. sparrmanii</i>	xxxx	xxxx	xxx	xxx	xxx
<i>T. rendalli</i>	xxxx	xxxx	xxx	xxx	xxx
<i>T. ruweti</i>	x	xx	x	xx	x
<i>H. fasciatus</i>	xx	-	-	-	xxx
<i>S. giardi</i>	xx	xx	xx	xxx	xx
<i>S. codringtoni</i>	x	xx	xxx	xxx	xxx
<i>S. carlottae</i>	x	x	xx	xx	xx
<i>P. darlingi</i>	xxxx	xx	xxx	xxx	xxx
<i>S. greenwoodi</i>	-	-	-	x	x
<i>S. robustus jallae</i>	xxx	xxx	xxx	xxx	xxx
<i>S. macrocephalus</i>	xxx	xxx	xxx	xxx	xxx
<i>S. longimanus</i>	x	-	xx	-	x
<i>S. angusticeps</i>	xxx	xx	xxx	xxx	xxx
<i>S. thumbergi</i>	x	-	xx	xxx	xxx
<i>P. philander</i>	xxxx	xxxx	xxx	xxx	xxx
<i>C. multispinis</i>	x	xxx	x	x	x
<i>C. crenotis</i>	x	xx	-	x	-
<i>M. frenatus</i>	x	x	-	-	x
<i>M. vanderwaali</i>	x	-	-	-	-

xxxx abundant    xxx common    xx regular    x rare    not collected

TABLE 3: Habitat preferences of fishes in Caprivi, expressed as relative frequency of occurrence.

	Stream, sandy substrate	Stream, rocky substrate	Deep water, standing	Shallow, swamp	Shallow, flood-plain
<i>P. catostoma</i>	x	x	-	xxx	xxx
<i>P. castelnaui</i>	-	x	-	xxx	xxxx
<i>H. ansorgii</i>	-	xx	-	-	-
<i>H. discorhynchus</i>	-	xx	x	-	-
<i>M. macrolepidotus</i>	x	x	xxx	xxx	xxx
<i>M. lacerda</i>	x	x	xxx	x	x
<i>H. vittatus</i>	xxxx	xxxx	xxx	-	-
<i>H. odoë</i>	xx	x	xxxx	xx	-
<i>A. lateralis</i>	x	x	xxxx	xxx	-
<i>M. acutidens</i>	xxxx	xxx	xx	x	-
<i>R. maunensis</i>	xxxx	-	xx	xxx	-
<i>H. multifasciatus</i>	x	x	x	xxx	-
<i>H. machadoi</i>	x	-	-	xxx	xxx
<i>N. macropterus</i>	x	xx	-	-	-
<i>B. codringtonii</i>	x	-	-	-	-
<i>B. poechii</i>	xx	x	xxx	xxxx	x
<i>B. paludinosus</i>	-	x	x	xxx	xxx
<i>B. eutaenia</i>	x	x	-	-	-
<i>B. tangandensis</i>	x	-	-	x	-
<i>B. multilineatus</i>	x	x	-	x	x
<i>B. afrovernayi</i>	x	-	-	x	x
<i>B. unitaeniatus</i>	xx	-	x	x	-
<i>B. lineomaculatus</i>	-	-	-	x	-
<i>B. bifrenatus</i>	x	x	x	xxxx	xxx
<i>B. thamalakanensis</i>	-	x	-	xxx	-
<i>B. fasciolatus</i>	x	-	-	xxx	xxx
<i>B. barotseensis</i>	x	-	-	xxx	x
<i>B. barnardi</i>	x	-	x	xxx	xx
<i>B. haasianus</i>	-	-	x	xxx	xxx
<i>B. radiatus</i>	x	-	x	xx	-
<i>C. wittei</i>	x	x	-	xxx	xxx
<i>L. cylindricus</i>	x	xxxx	-	-	-
<i>L. lunatus</i>	x	x	xx	x	-
<i>O. zambezensis</i>	x	x	-	-	-
<i>A. ngamensis</i>	x	x	xx	-	-
<i>Z. sp. (L. roundiceps)</i>	-	x	-	-	-
<i>Z. sp. (cf. L. dorae)</i>	x	-	-	-	-
<i>Zaireichthys sp.</i>	x	-	-	-	-
<i>C. garipepinus</i>	xx	-	xxxx	xxx	-
<i>C. ngamensis</i>	xx	-	xxx	xxxx	-
<i>C. theodoraë</i>	-	-	x	xx	xxx
<i>C. submarginatus</i>	-	-	x	x	-
<i>C. platyprosopos</i>	-	x	-	-	-
<i>S. mystus</i>	x	x	xxx	xxxx	x
<i>S. nigromaculatus</i>	xx	x	xxx	x	-
<i>S. woosnami</i>	x	x	xxxx	xxx	x
<i>S. macrostigma</i>	xx	x	xx	-	-
<i>S. leopardinus</i>	x	x	xx	-	-
<i>C. neumanni</i>	x	x	-	-	-
<i>A. uranoscopus</i>	-	x	-	-	-
<i>Nothobranchius sp.</i>	-	-	-	x	-
<i>A. johnstonii</i>	x	x	-	xxxx	xx
<i>A. katangae</i>	-	-	-	x	-
<i>A. hutereaui</i>	-	-	-	xxx	-
<i>O. macrochir</i>	xx	-	xxxx	xxx	x
<i>O. andersonii</i>	xxx	-	xxxx	xx	-
<i>T. sparrmannii</i>	xx	x	xxx	xxxx	xx
<i>T. rendalli</i>	xx	x	xxxx	xxx	xx
<i>T. ruweti</i>	-	x	x	xxx	xxx
<i>H. fasciatus</i>	-	x	x	xxx	-
<i>S. giardi</i>	xx	-	xxxx	x	-
<i>S. codringtoni</i>	xx	-	xxx	x	-
<i>S. carlottae</i>	x	-	xx	x	-
<i>P. darlingi</i>	xxx	x	xxx	xx	-
<i>S. greenwoodi</i>	x	-	x	-	-



	Stream, sandy substrate	Stream, rocky substrate	Deep water, standing	Shallow, swamp	Shallow, flood-plain
<i>S. robustus jallae</i>	xx	-	xxx	x	-
<i>S. macrocephalus</i>	xx	x	xxxx	xx	-
<i>S. longimanus</i>	-	-	x	-	-
<i>S. angusticeps</i>	x	-	xxx	x	-
<i>S. thumbergi</i>	x	-	x	x	-
<i>P. philander</i>	x	x	x	xxxx	xxx
<i>C. multispinis</i>	-	-	x	xxxx	xxx
<i>C. cienotis</i>	-	-	-	xxx	xxx
<i>M. frenatus</i>	-	x	-	-	x
<i>M. vanderwaali</i>	-	x	-	-	-

xxxx abundant    xxx common    xx regular    x rare    - not collected

that fish species may have been missed out as a result of two factors:

Temporary limited distribution or selective habitat preference of a fish where it is difficult to collect. Examples of the first-mentioned group are *Nothobranchius* sp. which was collected only from three localities and *Barbus haasianus* and *Coptostomabarbus wittei* collected only from November 1974 onwards from a few localities and in 12 and 15 localities respectively from the 1975 flood onwards. It seems that these species can increase in abundance and occurrence in a short time after favourable habitats have been formed by good and high floods. Fish that are difficult to collect are those, for example, living only in rapids. During the whole period of collection only four *Barbus codringtonii* were collected in spite of specific attention: the species may be more plentiful in rapids than the results indicate. Other fish that require particular effort and equipment for collection include *Hippopotamyrus ansorgii*, *Nannocharax macropterus*, *Zaireichthys* spp., *Clariallabes platyprosopos* and *Mastacembelus* spp.. Daytime hand-net collections on the sand-banks of the Kwando River did not yield any *Zaireichthys* spp. but nocturnal efforts were successful. The shocking apparatus also proved its value, and was especially effective for collecting crevice-living fishes such as *C. platyprosopos*, *Mastacembelus frenatus* and *M. vanderwaali*. The following fish species have been recorded by Bell-Cross (1972) from the Upper Zambezi System but were not collected: *Anguilla bengalensis-labiata*, *Mormyrus ellenbergeri*, *Kneria auriculata*, *K. polli*, *Barbus afrohamiltoni*, *B. annectens*, *B. bellcrossi*, *B. manicensis*, *B. neefi*, *Neobola brevianalis*, *Eutropius yangambianus*, *Hypsopanchax jubbi* and *Nothobranchius taeniopygus*. Certain of these species are only known from headwater tributaries and are therefore probably excluded from Caprivi by ecological factors. Such species include *Kneria auriculata*, *Kneria polli*, *Barbus bellcrossi*, *B. neefi* and *Hypsopanchax jubbi*. *Barbus annectens* and *B. barotseensis* are considered as probable synonyms (Jubb, 1967) and the same is likely of *Mormyrus ellenbergeri* and *M. lacerda*. The identification of *Barbus afrohamiltoni* and *B. manicensis* from the upper Zambezi requires confirmation but they may also be ecological exclusions from Caprivi. *Anguilla labiata* is certainly not a com-

mon species above Victoria Falls and the building of Kariba and Caborabasa Dams is likely to have reduced its presence even further. Bell-Cross' (1972) record of this species was from the intake to the hydro-power station at Victoria Falls.

Table 2 shows that certain species have not been collected from the Zambezi River or its flood-plains: *Haplochromis greenwoodi* and *Zaireichthys* sp.. Habitat preferences of these two fish seem to indicate that suitable habitats may exist in the Zambezi. On the other hand, the following rheophilic species are absent from the Kwando-Linyanti: *Hippopotamyrus ansorgii*, *H. discorhynchus*, *Nannocharax macropterus*, *B. codringtonii*, *Labeo cylindricus*, *Zaireichthys*, sp. *C. platyprosopos*, *C. neumanni*, *Amphilius uranoscopus* and *M. vanderwaali*. Other fish species that were collected in other habitats in the Zambezi, but which are absent from the Kwando-Linyanti, include: *B. eutaenia*, *B. tangandensis*, *B. puellus* and *Zaireichthys* sp.. *Nothobranchius* sp. was collected only at three localities, one a small isolated pool in a small temporary stream draining part of a flood-plain into the large permanent Mutual-ize Channel, and the others in two small forest pans on the extreme edge of the flood-plain of the Zambezi.

Despite an intensive search the *Nothobranchius* sp. was not-found in any other similar pans. Both these small pans lie adjacent to main gravel roads and the water is being used by local farmers and their stock and also by road-building contractors which therefore imposes a threat to these habitats.

Table 3 summarises habitat preferences of the fish species of Caprivi. The following fish species are rapid-loving as they were not found in any other habitat: *H. ansorgii*, *Zaireichthys* sp., (*L. rotundiceps*), *C. platyprosopos*, *A. uranoscopus* and *M. vanderwaali*. These fish species exhibit typical rheophilic adaptations as described by Roberts and Stewart (1976): reduction of eye size (*H. ansorgii*, *Zaireichthys* sp., *L. rotundiceps*, *C. platyprosopos* and *A. uranoscopus*); dark blue grey (*H. ansorgii*, *C. platyprosopos*) or mottled colouration (*Zaireichthys* sp., *A. uranoscopus* and *M. vanderwaali*); depressed heads (*Zaireichthys* sp., *C. platyprosopos* and *A. uranoscopus*) and specially modified fins and mouths (*Zaireichthys* sp. and *A. uranoscopus*). A

number of fish species prefer running water, not necessarily rapids, and were not collected in any swamp, flood-plain or deep standing water: *H. ansorgii*, *H. discorhynchus*, *N. macropterus*, *B. codringtonii*, *B. eutaenia*, *Opsaridium zambezensis*, *L. cylindricus*, *Zaireichthys* sp. (cf. *L. dorae*) *C. platyprosopos*, *A. uranoscopus* and *M. vanderwaali*. Of this group *B. codringtonii* and *Zaireichthys* spp. were collected only over a sandy substrate.

The fish fauna of Caprivi is, however, more characterised by swamp and flood-plain-loving fish species. The following species belong to this group: *Petrocephalus catostoma*, *Pollimyrus castelnaui*, *Marcusenius macrolepidotus*, *Rhabdalestes maunensis*, *Hemigrammocharax multifasciatus*, *H. machadoi*, *Barbus poechii*, *B. paludinosus*, *B. bifrenatus*, *B. thamalakanensis*, *B. fasciolatus*, *B. haasianus*, *B. barotseensis*, *B. barnardi*, *Coptostomabarbus wittei*, *Clarias theodora*, *C. submarginatus*, *Schilbe mystus*, *Nothobranchius* sp., *Aplocheilichthys johnstonii*, *A. katangae*, *A. huteveai*, *Tilapia sparrmanii*, *T. ruweti*, *Hemichromis fasciatus*, *P. philander*, *Ctenopoma multispinis* and *C. ctenotis*.

TABLE 4: Occurrence of fish species beneath *Salvinia* mats.

Fish species	3 small pools, completely covered, mat 50cm thick, Schuckmannsburg.	Side of 100m wide mat, covered by secondary growth of Cyperaceae, 100 cm thick, Lisiküll.	Small pool, totally covered, Mutualwize.	Small pool, totally covered, Hippo Island, Zambezi River.	Running water at bridge draining extensive swamp, smelling to H <sub>2</sub> S, Ngoma.
<i>P. catostoma</i>	x		x		
<i>M. castelnaui</i>		xx	xx		
<i>M. macrolepidotus</i>	x	xx	xx	x	
<i>H. multifasciatus</i>	x				
<i>B. poechii</i>		x	x		
<i>B. paludinosus</i>	xx	x			x
<i>B. barnardi</i>	x				
<i>B. fasciolatus</i>	x				
<i>C. gariepinus</i>			x		
<i>C. ngamensis</i>			xx		xx
<i>C. theodora</i>	xx	xx	xx	xx	
<i>C. submarginatus</i>		x			
<i>S. mystus</i>	x	xx	xx		
<i>S. nigromaculatus</i>			x		
<i>S. woosnami</i>		x	x		
<i>A. johnstonii</i>	x				
<i>S. macrochir</i>	x				
<i>T. rendalli</i>	x			x	
<i>T. sparrmanii</i>	xx			x	
<i>T. ruweti</i>					x
<i>P. philander</i>	x				
<i>C. multispinis</i>		x	xx		xx
<i>C. ctenotis</i>	xx				x
<i>M. frenatus</i>	x	x	x		

xx common x rare

The extreme tolerance to deoxygenation of some of these fishes was illustrated where the water body in which they lived was completely covered by the floating exotic *Salvinia molesta* as summarised in Table 4.

It is interesting to note that the more economically important fish species on which a subsistence and a cash fishery is based have a wide habitat selection and are also distributed throughout the region. These important species include: *Hepsetus odoë*, *Clarias gariepinus*, *C. ngamensis*, *Oreochromis macrochir*, *O. andersonii*, *T. rendalli* and other large cichlids. *Hydrocynus vittatus* is also included but is an exception in that it was never collected in shallow standing water.

The present fishery of Caprivi is selective, cropping only the larger fish species (Van der Waal, 1980), whereas the area is endowed with many smaller, potentially utilisable species that are abundant in many habitats. This resource should also be exploited to ensure a better balanced fishery by making use of smaller mesh gill-nets of 50 to 70 mm stretched mesh. It has been shown (Van der Waal, 1980) that relatively few immatures of the larger growing fish species will be caught in these nets. Caprivi has a unique fish fauna and this survey has shown that some species deserve special conservation attention. In the first place those species with narrow habitat requirements where the habitat itself is vulnerable. *Nothobranchius* sp. is a good example of this category. A second category is those species with limited distribution that have special appeal to the aquarium industry e.g. *Nothobranchius* sp., *C. platyprosopos* and *M. vanderwaali*. It is suggested that special conservation status be given to these species and measures be taken to safeguard their environment and to prevent their exploitation. Controlled cropping of larger and medium fish species for consumption and of small fish species for the aquarium trade just after the Zambezi floods recede in May to July can, however, be justified.

## 6 ACKNOWLEDGEMENTS

This collection has been made possible through the creation of a fishery research post by the Department of Cooperation and Development and also by the active help of the Department of Agriculture of the Caprivi Government Service by which one of us (B.C.W. v.d. W.) was employed. Our thanks are also due to the willing and reliable fisheries assistants who helped during the four-year project and also during the two-week joint collection trip in September-October 1975: Messrs. Vincent Simana, Cletius Mowa, John Kamwi, Leonard Muhanze and Alfred Lifuna.

A special word of thanks must also go to Mr. Graham Bell-Cross and to Dr. Rex Jubb for the identifications and practical advice for identification in the field of some "problem species".

It is the wish of the authors that this paper may contribute towards a better understanding of God's creation and that He will be praised through wise and responsible development and utilisation of this natural resource.



## 7 REFERENCES

- BELL-CROSS, G.  
1972: The fish fauna of the Zambezi River System. *Arnoldia*, 5 (2a): 1 – 19.
- COLQUHOUN, B. and partners.  
1968: Report on bridge across the Chobe River at Ngoma, Eastern Caprivi. Report to Dept. Bantu Administration and Development, 26 pp.
- DU TOIT, A.L.  
1926: Report of the Kalahari Reconnaissance of 1925. Govt. Printer, Pretoria. 69 pp.
- ECCLES, D.H.  
in prep.: Zaireichthyidae (Telcostei, Siluriformes), a new family of African dwarf catfishes, with descriptions of a new genus and seven new species and a consideration of the genera *Leptoglanis* Boulenger and *Zaireichthys* Roberts.
- FOWLER, H.W.  
1935: Scientific results of the Vernay-Lang Kalahari expedition, March to September, 1930. *Ann. Transv. Mus.* 16 (2): 251 – 293.
- GUY, G.L.  
1962: Trip to the E. Caprivi Zipfel. Mimco report: *Queen Victoria Museum, Interim Report* No 5. 4 pp.
- JACKSON, P.B.N.  
1961: Ichthyology. Kariba Studies. The fish of the Middle Zambezi. Trustees of the National Museums of Southern Rhodesia. Manchester University Press. 36 pp.
- JUBB, R.A.  
1958: A preliminary report on the collections of freshwater fishes made by the Bernard Carp Expeditions to the Caprivi Strip, 1949, the Lower Sabi River, 1950 and to Barotseland, 1952. *Occ. Pap. Natn. Mus. Southern Rhod.* 22B: 177 – 189.
- 1967: *Freshwater fishes of Southern Africa*. A.A. Balkema. Cape Town. 248 pp.
- JUBB, R.A. and GAIGHER, I.G.  
1969: Check list of the fishes of Botswana. *Arnoldia* (Rhod.), 5 (7): 1 – 22.
- ROBERTS, T.R. and STEWART, D.J.  
1976: An ecological and systematic survey of fishes in the rapids of the Lower Zaire or Congo River. *Bull. Mus. Comp-Zool.* 147 (6): 239 – 317.
- SEAMAN, M.T.; SCOTT, W.E.; WALMSLEY, R.D.; VAN DER WAAL, B.C.W. and TOERIEN, D.F.  
1978: A limnological investigation of Lake Liambezi, Caprivi. *J. Limnol. Soc. sth. Afr.* 4 (2): 129 – 144.
- SKELTON, P.H.  
1976: A new species of *Mastacembelus* (Pisces, Mastacembelidae) from the Upper Zambezi River with a discussion of the taxonomy of the genus from this system. *Ann. Cape Prov. Mus. (Nat. Hist.)* 11:103–116.
- In press:  
1957: A systematic revision of species of the catfish genus *Amphilius* (Siluroidei, Amphiliidae) from east and southern Africa. *Ann. Cape Prov. Mus. (Nat. Hist.)*.
- VAN DEN BERG, W.J.  
1956: Report on Native fishing methods and fish from the Upper Zambezi and Mashi Rivers. Bernard Carp Barotseland Expedition July/August 1952. *Piscator* 37: 42 – 47.
- VAN DER WAAL, B.C.W.  
1980: Aspects of the fisheries of Lake Liambezi, Caprivi. *J. Limnol. Soc. sth. Afr.* 6 (1): 19 – 31.